CLEARANCE DETECTOR AND METHOD FOR MOTION AND DISTANCE

ABSTRACT OF THE DISCLOSURE

A method for correct and efficient detection of clearances between three-dimensional bodies in
5   computer-based simulations, where one or both of the volumes is subject to translation and/or rotary
motion. The method conservatively determines of the size of such clearances and whether there is a
collision between the bodies. Given two bodies, each of which is undergoing separate motions, the
method creates bounding-volume hierarchy representations for the two bodies and, mappings and
inverse mappings for the motions of the two bodies, and a path. The motions of the bodies can begin at
10   positions and orientations other than the bodies' canonical positions and orientations. The method uses
the representations, mappings and vector to determine the furthest locations of the bodies and hence
the closest points between the bodies, and then uses the points to determine the clearance between the
bodies without having to calculate the convex hulls of the bodies. The method extends a hierarchical
approach to clearance determination. Instead of determining clearances between nodes from the
15   bounding volume hierarchies, it computes clearances between the convex hulls of the volumes virtually
swept by nodes from the hierarchies over the duration of the motions without exact or approximate
construction of the convex hulls. The method includes means of determining clearance size and
whether there is a collision. The method includes clearance detection for bodies comprising convex
geometrical primitives and more specific techniques for bodies comprising convex polyhedra.

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